UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

SINGULAR COMPUTING LLC, Plaintiff, v. GOOGLE LLC, Defendant.	Civil Action No. 1:19-cv-12551-FDS Hon. F. Dennis Saylor IV

DECLARATION OF DR. JOHN L. GUSTAFSON
IN SUPPORT OF DEFENDANT GOOGLE LLC'S OPPOSITION TO PLAINTIFF'S MOTION FOR PARTIAL SUMMARY JUDGMENT OF VALIDITY

I, John L. Gustafson, declare and state as follows:

1. I am currently a Visiting Scholar at Arizona State University. In 1977, I earned my B.S. in Applied Mathematics, with honors, from the California Institute of Technology. In 1981 and 1982, I earned my M.S. and Ph.D., respectively, in Applied Mathematics from Iowa State University. Since completing my doctoral degree, I have held numerous positions—in academia, the private sector, and at U.S. federal research institutions—as a professor, engineer, and scientist in the field of computer science. I have been retained by Defendant Google LLC ("Google") as an expert witness in this litigation to assess the validity of claim 53 of U.S. Patent No. 8,407,273 and claim 7 of U.S. Patent No. 9,218,156 (collectively, the "Asserted Claims"); to prepare an expert report setting forth my opinions; and to testify at deposition and at trial about my opinions, if needed.

2. I submit this declaration in support of Google's Opposition to Plaintiff Singular Computing LLC's ("Singular") Motion for Partial Summary Judgment of Validity. I have

personal knowledge of the facts stated herein, and if called as a witness, I could testify to them competently under oath.

3. For my forthcoming expert report, counsel for Google has asked me to assess the validity of the Asserted Claims in light of certain prior art systems. My opinions will be based on my years of education and experience in the computing field, as well as my study and analysis of three prior art systems. Specifically, I will provide my opinions on the validity of the Asserted Claims based on the VFLOAT System, the CNAPS System, and the GRAPE-3 System.

4. In my forthcoming expert report, I will explain my opinions, which will rely on a variety of evidentiary sources that disclose how each of the Systems actually functioned in the past—not just how the Systems are described in publications such as journal articles.

Qualifications and Experience

5. I have over 40 years of experience in the computer science field. My focus has been on computer arithmetic (*i.e.*, the ways that computers perform mathematical operations) and parallel processing (*i.e.*, techniques to accelerate computing tasks by breaking them down into smaller tasks that are simultaneously executed). I have published over 100 academic papers in peer-reviewed journals or textbooks. Also, in 1988, I was awarded the inaugural Gordon Bell Prize—sometimes called the "Nobel Prize of Supercomputing"—for my work that achieved thousand-fold speedups in the completion of computing tasks, and my creation of a novel theoretical model explaining how that was possible. The model is now called "Gustafson's law" and is taught in undergraduate and graduate-level computer science classes.

6. Attached hereto as **Exhibit A** is a true and correct copy of my curriculum vitae.

The VFLOAT System

7. In my forthcoming expert report, I will opine that the Asserted Claims are invalid over the VFLOAT System.

8. My analysis of the VFLOAT System is not solely derived from, or limited to, the manner in which the VFLOAT System is described in printed publications.

9. I will base my opinion on evidence that the VFLOAT System existed as a physical system, including anticipated testimony from Dr. Miriam Leeser that describes her personal role in developing the VFLOAT System and physically implementing it in hardware at Northeastern University in Boston, Massachusetts, by around 2002, as well as her firsthand participation in numerous public presentations that disclosed how the VFLOAT System was developed and implemented in hardware.

10. I will further base my opinion that the VFLOAT System was being operated and used on evidence that includes anticipated testimony from Dr. Leeser describing her firsthand knowledge of the VFLOAT System's capabilities. For instance, in a public presentation, Dr. Leeser and her graduate students described how the VFLOAT System was used to implement a machine-learning algorithm for analyzing satellite imagery. In addition, Dr. Leeser and I have discussed details—which I understand were not published—about the workstation she used in Northeastern University's Reconfigurable Computer Laboratory to demonstrate the VFLOAT System's capabilities in hardware.

11. On November 17 and December 1, 2022, I met with Dr. Leeser by internet videoconference to discuss Dr. Leeser's firsthand knowledge of the VFLOAT System's development, disclosure to the public, and use.

12. I will also opine that the VFLOAT System could have been configured or modified in view of the prior art into a system that also invalidates the Asserted Claims; for support, my evidence will include all the information about the VFLOAT System discussed above in paragraphs 8–11.

The CNAPS System

13. In my forthcoming expert report, I will opine that the Asserted Claims are invalid over the CNAPS System.

14. My forthcoming analysis of the CNAPS System is not solely derived from, or limited to, the manner in which the CNAPS System is described in printed publications.

15. I will base my opinion on evidence that the CNAPS System existed as a physical system, including the deposition testimony of Dr. Dan Hammerstrom describing his firsthand knowledge of how the CNAPS System was designed and then manufactured as a physical product starting in 1990 by Adaptive Solutions, Inc.—which I understand was a company founded by Dr. Hammerstrom. I will also base my opinion upon materials describing the CNAPS System—which disclose technical details about the CNAPS System and which I understand were produced by Dr. Hammerstrom in response to a subpoena—and the deposition testimony of Dr. Hammerstrom describing his firsthand knowledge of how Adaptive Solutions, Inc. offered the CNAPS System for sale to customers.

16. I will further base my opinion that the CNAPS System was being operated and used on evidence that includes the deposition testimony of Dr. Hammerstrom describing his firsthand knowledge of the CNAPS System's capabilities and potential improvements to its design. For instance, Dr. Hammerstrom discussed the design considerations for the CNAPS System and elaborated upon various changes that he hoped to make for the next version of the

CNAPS System—such as using floating-point format numbers in lieu of fixed-point format numbers to perform mathematical operations.

17. I will also opine that the CNAPS System could have been configured or modified in view of the prior art into a system that also invalidates the Asserted Claims; for support, my evidence will include all the information about the CNAPS System discussed above in paragraphs 14–16.

The GRAPE-3 System

18. In my forthcoming expert report, I will opine that the Asserted Claims are invalid over the GRAPE-3 System.

19. My forthcoming analysis of the GRAPE-3 System is not solely derived from, or limited to, the manner in which the GRAPE-3 System is described in printed publications.

20. I will base my opinion on evidence that the GRAPE-3 System existed as a physical system, including my firsthand encounter with the GRAPE-3 System. For instance, in 1992, I attended the 1992 International Conference for High Performance Computing, Networking, Storage and Analysis (also known as "Supercomputing '92" or "SC'92"), which was held in Minneapolis, Minnesota; there, I saw the physical GRAPE-3 System on display at the conference showroom. My recollection was confirmed by one of the designers of the GRAPE-3 System, Dr. Junichiro Makino, whom I met in-person at the Supercomputing '22 conference held in Dallas, Texas, between November 14–17, 2022. I will also rely upon the fact that in January 1992, I attended the Twenty-Fifth Annual IEEE Hawaii International Conference on System Sciences, which was held in Kauai, Hawaii; there, I attended a technical paper presentation about the GRAPE-3 System.

21. I will also opine that the GRAPE-3 System was, or could have been, configured or modified in view of the prior art into a system that also invalidates the Asserted Claims; for support, my evidence will include all the information about the GRAPE-3 System discussed above in paragraphs 19–20.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge.

Executed on December 12/9/2022, 2022, at Glendale, Arizona.

DocuSigned by:
Dr. John L Gustafson
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John L. Gustafson

CERTIFICATE OF SERVICE

I certify that this document is being filed through the Court's electronic filing system, which serves counsel for other parties who are registered participants as identified on the Notice of Electronic Filing (NEF). Any counsel for other parties who are not registered participants are being served by first class mail on the date of electronic filing.

Dated: December 9, 2022

/s/ Nathan R. Speed
Nathan R. Speed